

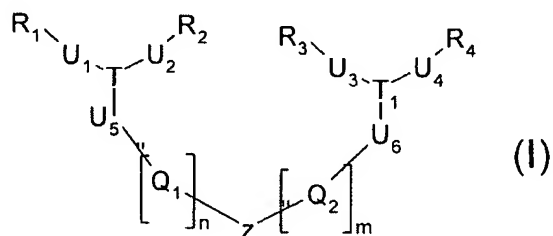
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1-24 (Canceled)

25. (Previously presented) A process for hydrocyanating a hydrocarbon compound containing at least one ethylenic unsaturation by reacting it in a liquid medium with hydrogen cyanide in the presence of a catalyst comprising a metallic element selected from transition metals and an organic ligand, wherein the organic ligand corresponds to the general formula I below:



in which:

T and T₁, which are identical or different, represent a phosphorus, arsenic or antimony atom,

U₁, U₂, U₃, U₄, U₅, and U₆, which are identical or different, represent an oxygen atom or a radical NR, R representing an alkyl, aryl, sulphonyl or carbonyl radical,

R₁, R₂, R₃ and R₄, which are identical or different, represent a substituted or unsubstituted, aromatic, aliphatic or cycloaliphatic radical having one or more rings, which are in fused form or not and which optionally contain one or more

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heteroatoms, where the radicals R_1 and R_2 on the one hand and R_3 and R_4 on the

other hand are optionally interconnected by a covalent bond, a hydrocarbon chain

or a heteroatom, and, when one of the radicals U_1 , U_2 , U_3 and U_4 includes an N

atom, the associated radical R_1 , R_2 , R_3 or R_4 optionally form a ring including the N

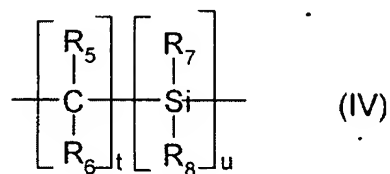
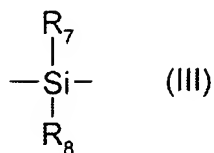
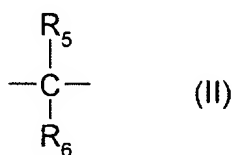
element of said radical,

m and n are identical or different integers between 0 and 6, where $m + n$ must be

greater than or equal to 1,

Q_1 and Q_2 , which are identical or different, represent a group corresponding to the

general formulae II, III or IV below:



in which R_5 , R_6 , R_7 and R_8 , which are identical or different, represent aliphatic,

cycloaliphatic or aromatic hydrocarbon radicals having 1 to 12 carbon atoms, R_5

and R_6 also representing the hydrogen atom, and

t and u represent integers between 0 and 6, with a sum $u + t$ greater than or equal to

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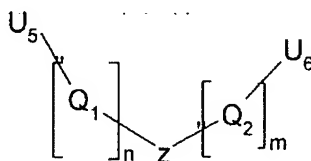
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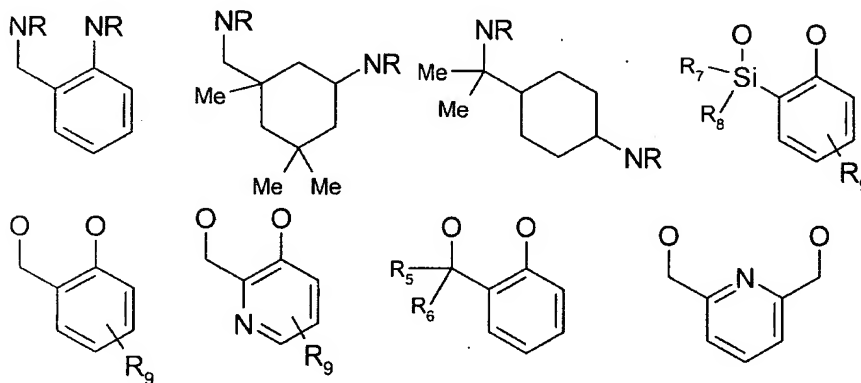
1,

Z representing a divalent radical selected from the group consisting of aromatic or cycloaliphatic radicals containing one or more rings, which are in fused form or not and which are optionally substituted and optionally contain heteroatoms.

26. (Previously presented) The process according to Claim 25, wherein the ligand of formula I comprises a structure of the formula below:



selected from the group consisting of the following structures:



in which R₉ represents a halogen atom, alkyl, an aryl, alkoxy, aryloxy, nitro, thioalkyl, secondary amine or nitrile group.

27. (Previously presented) The process according to Claim 25, wherein the organic ligand is selected from the group consisting of the compounds of the formula below:

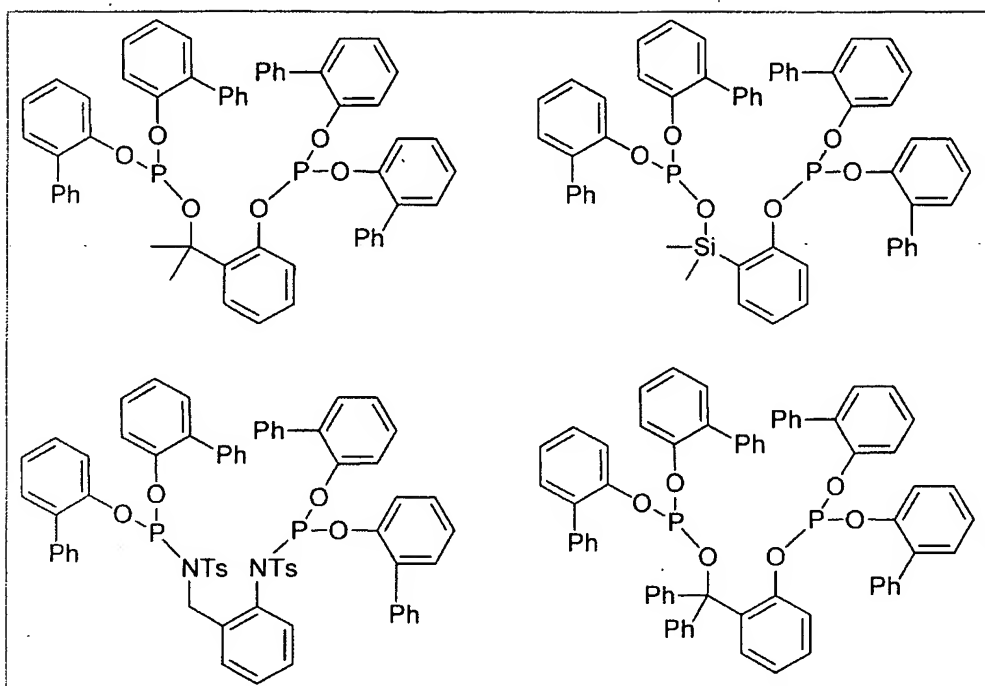
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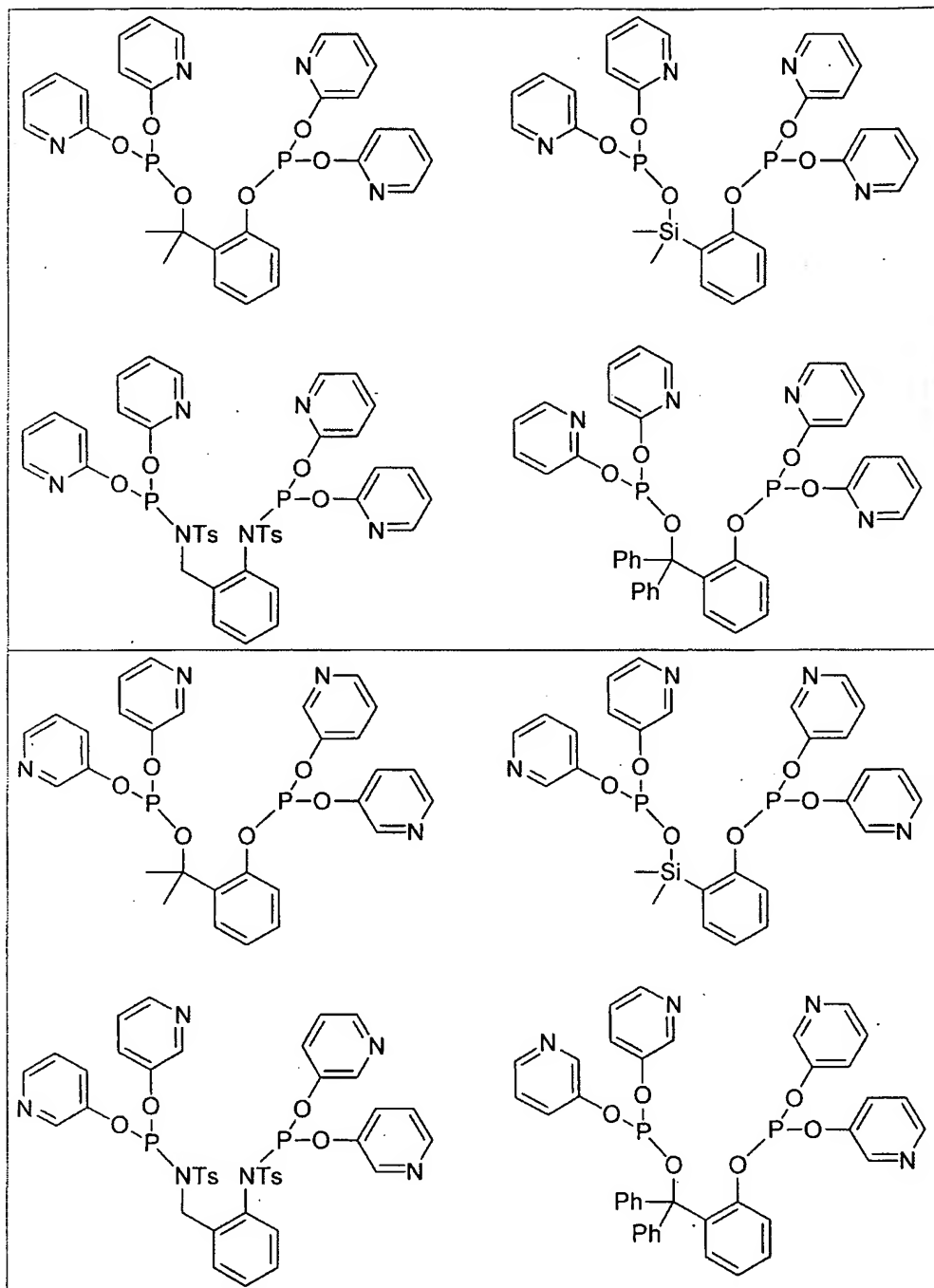
Jean-Louis SEUGNET

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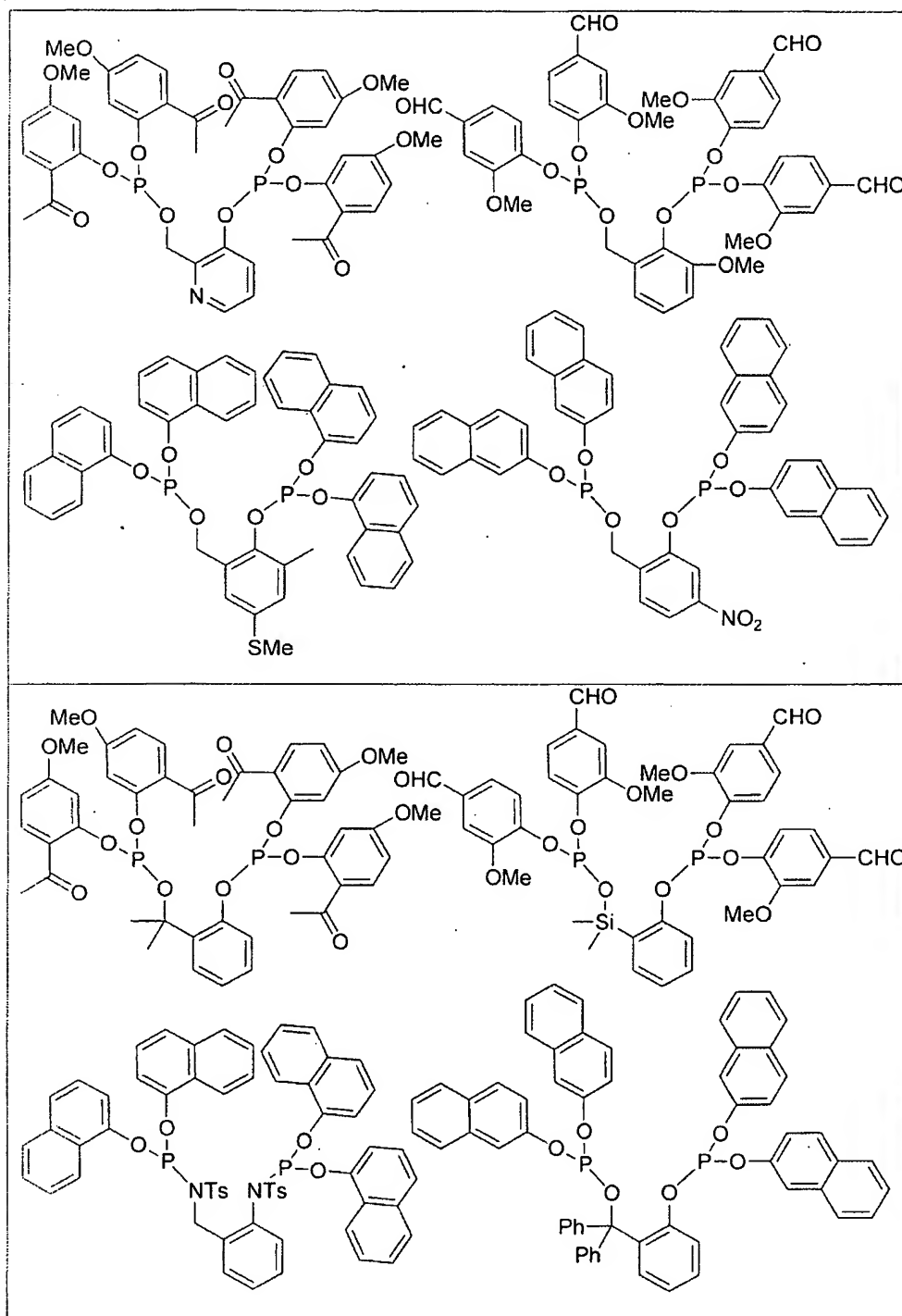
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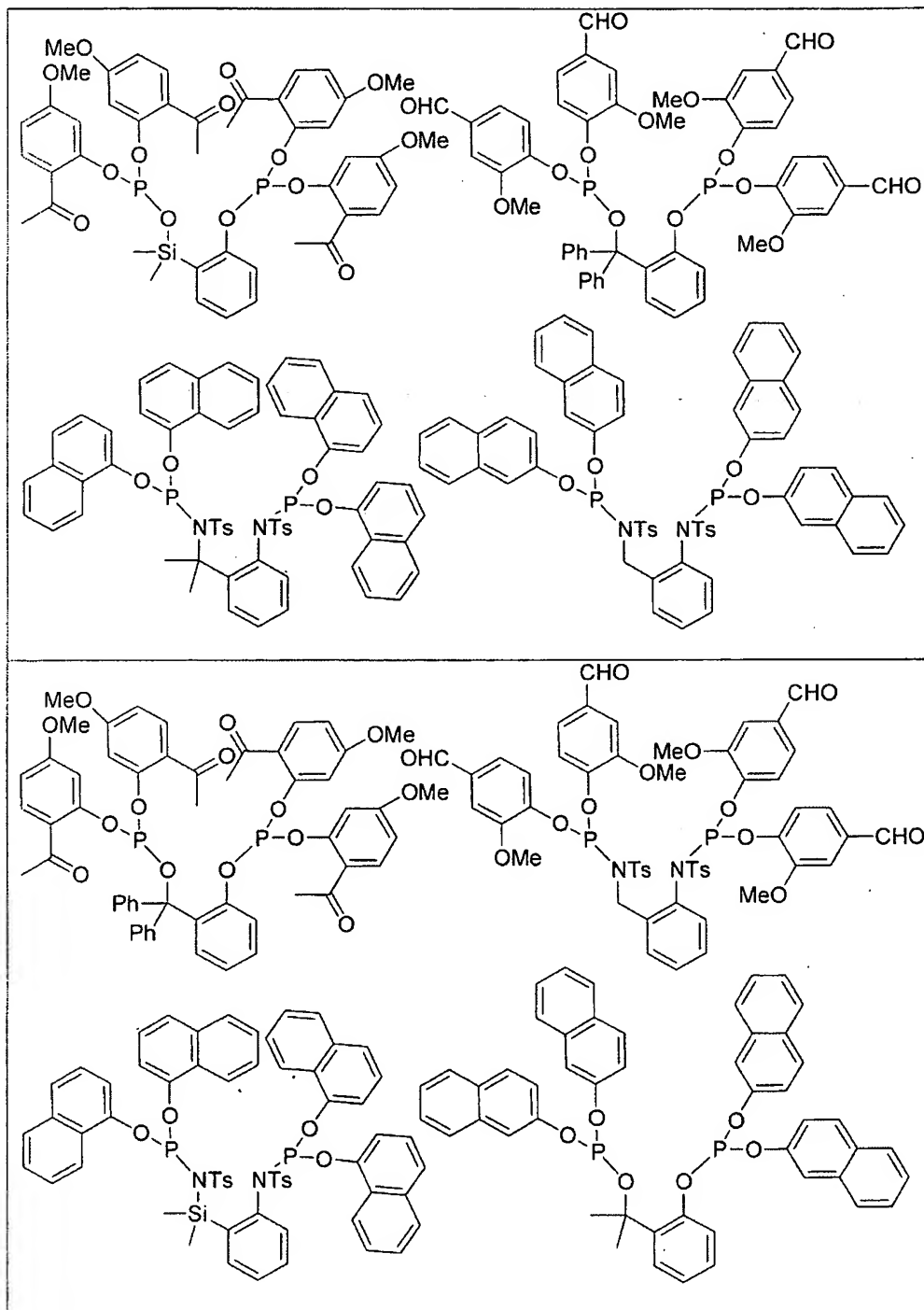


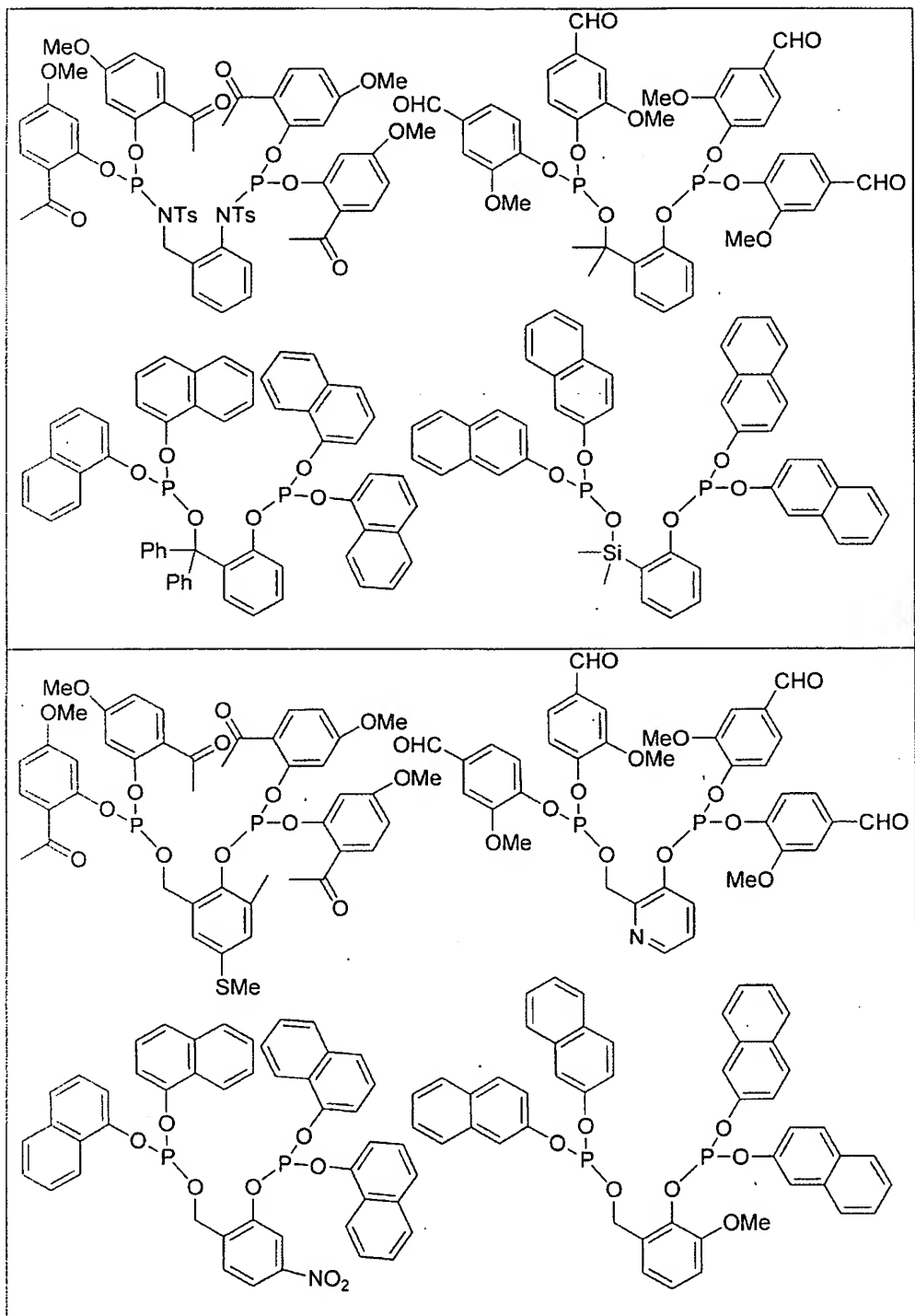
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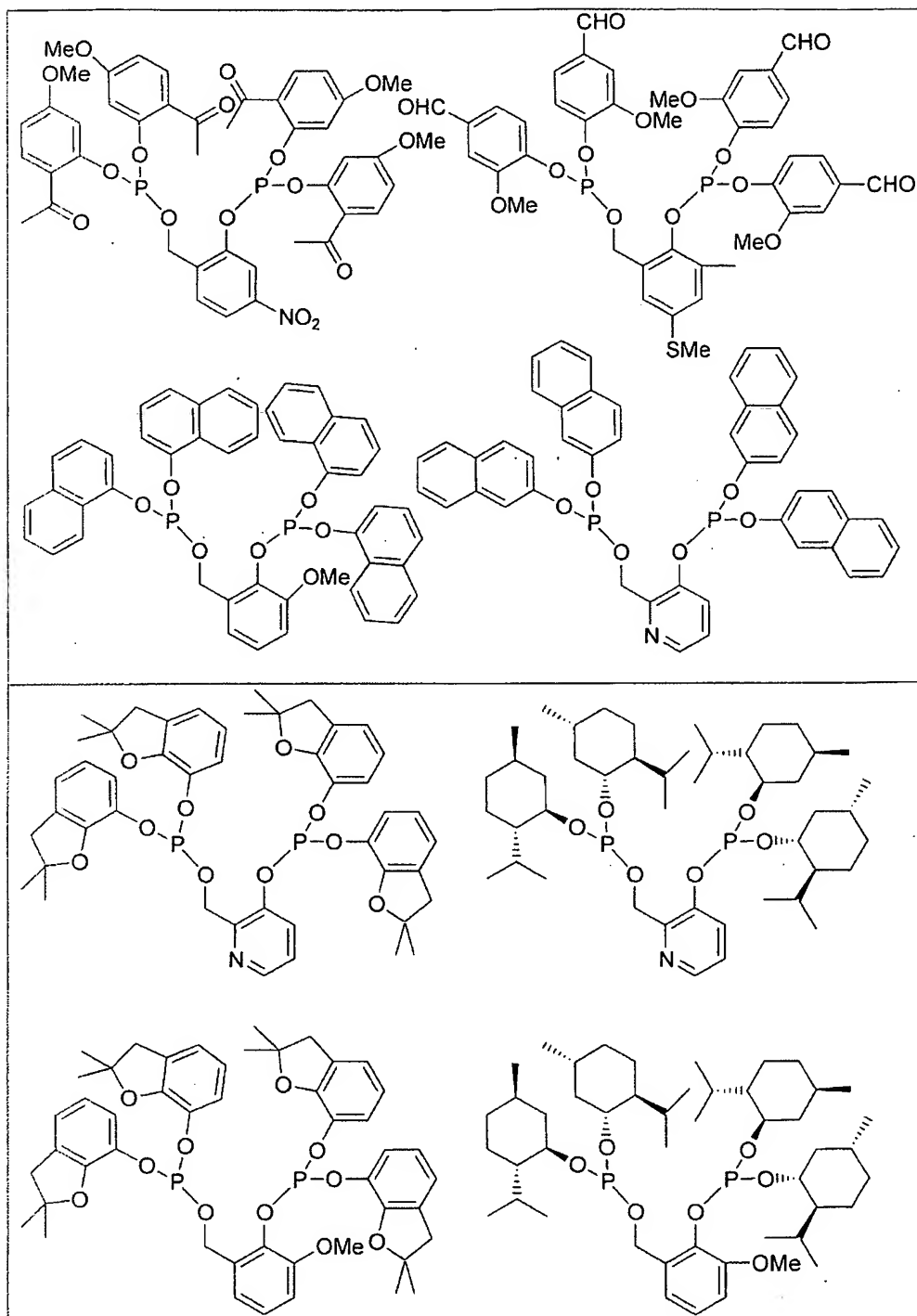
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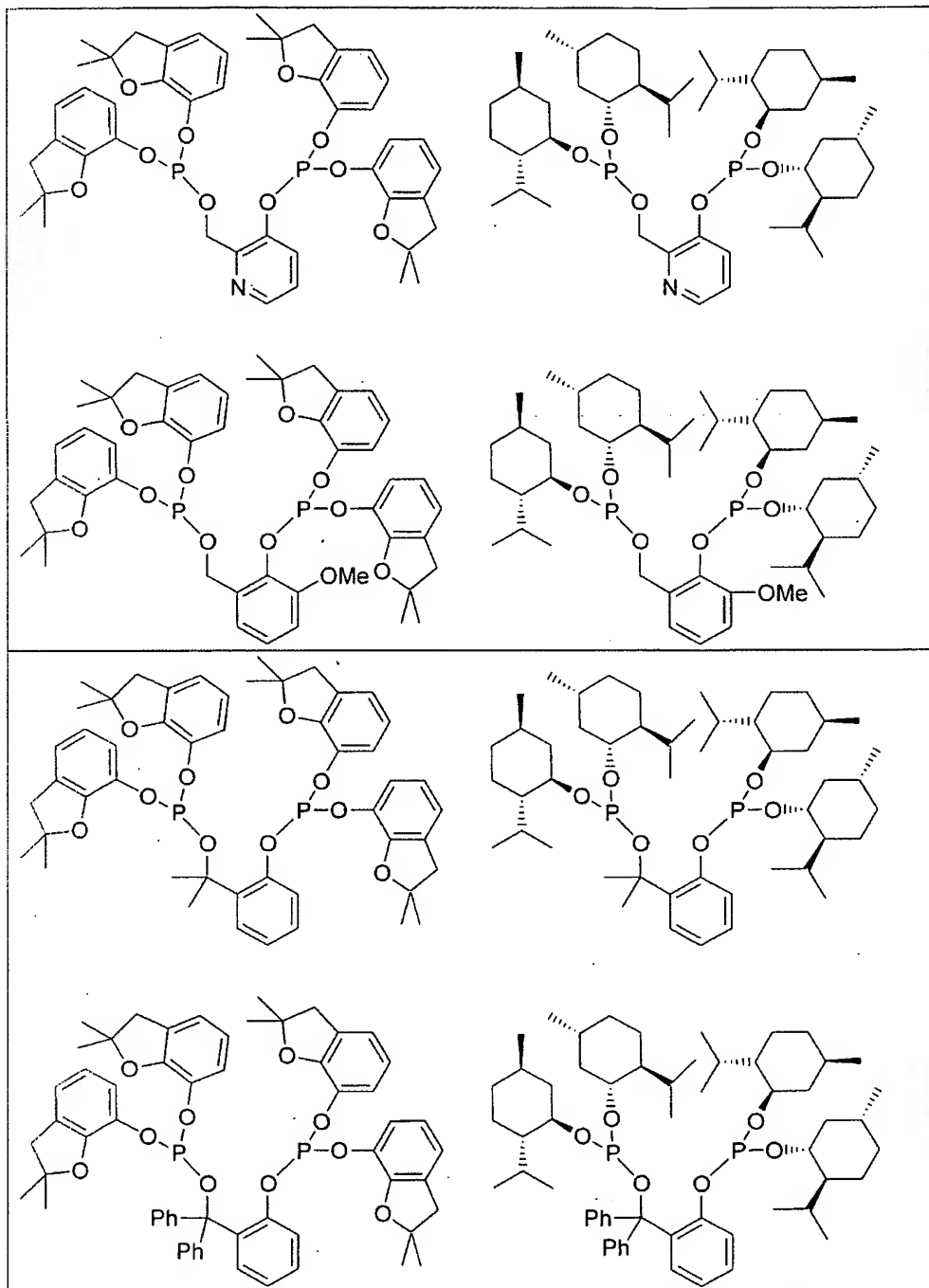
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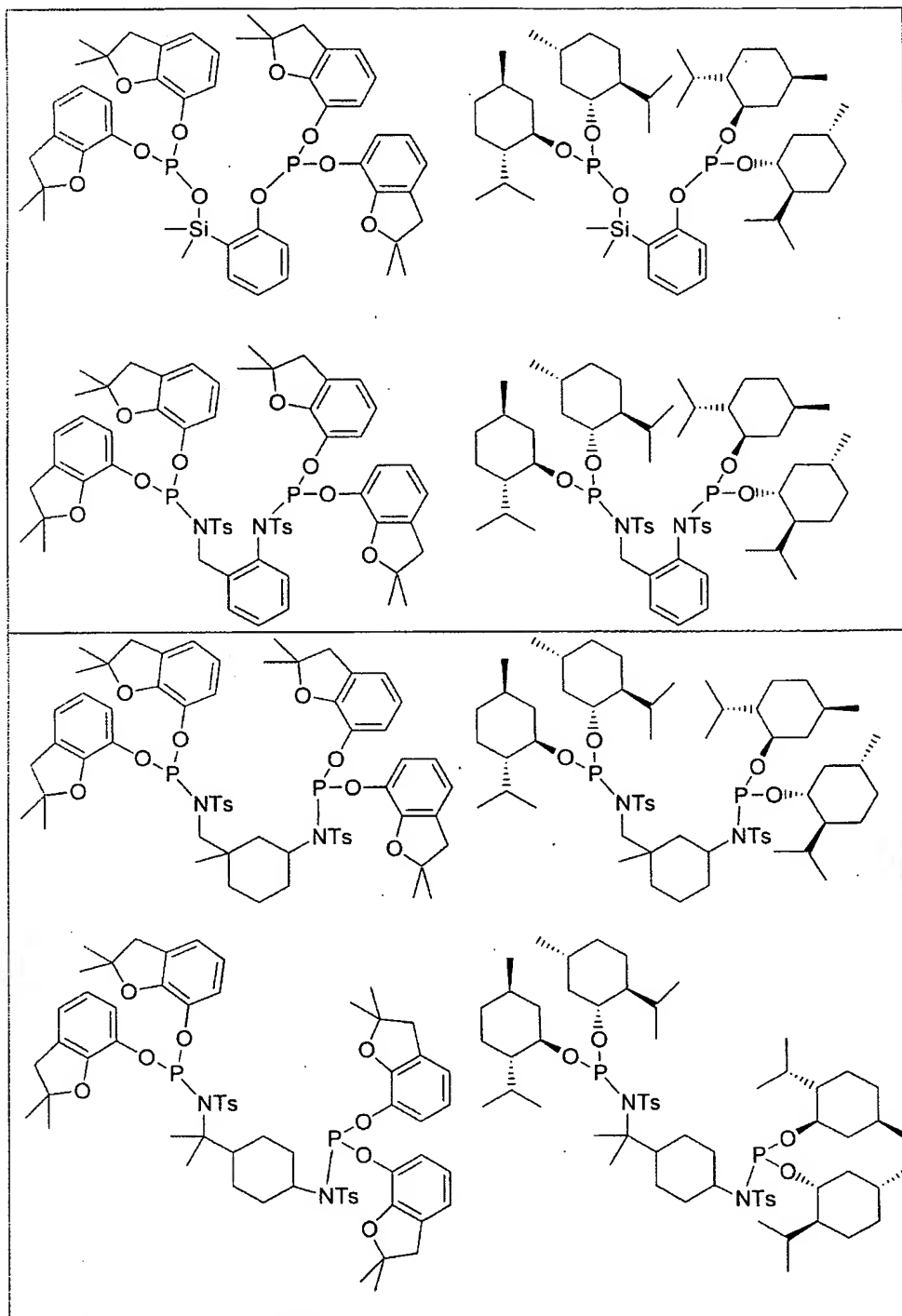


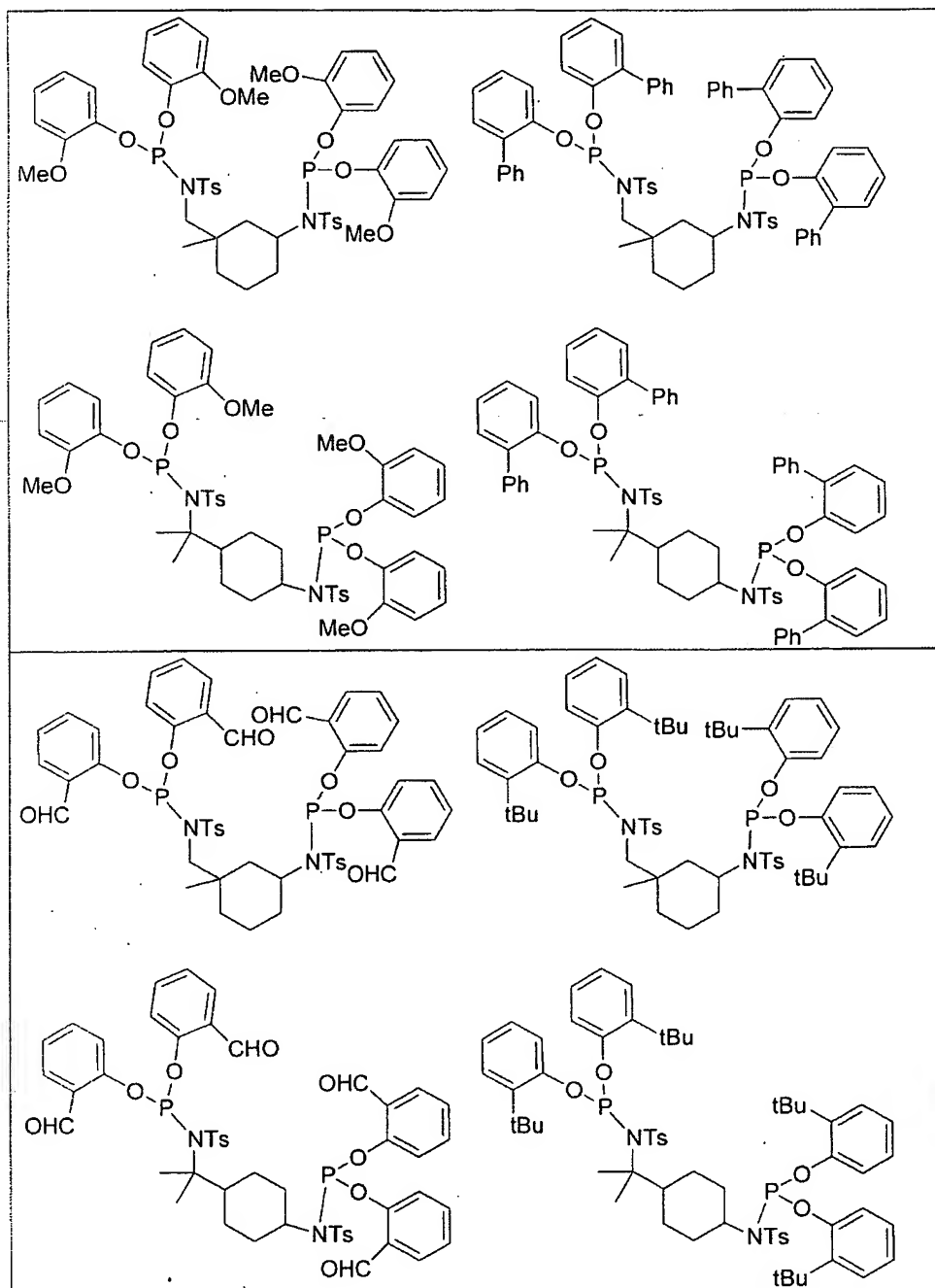
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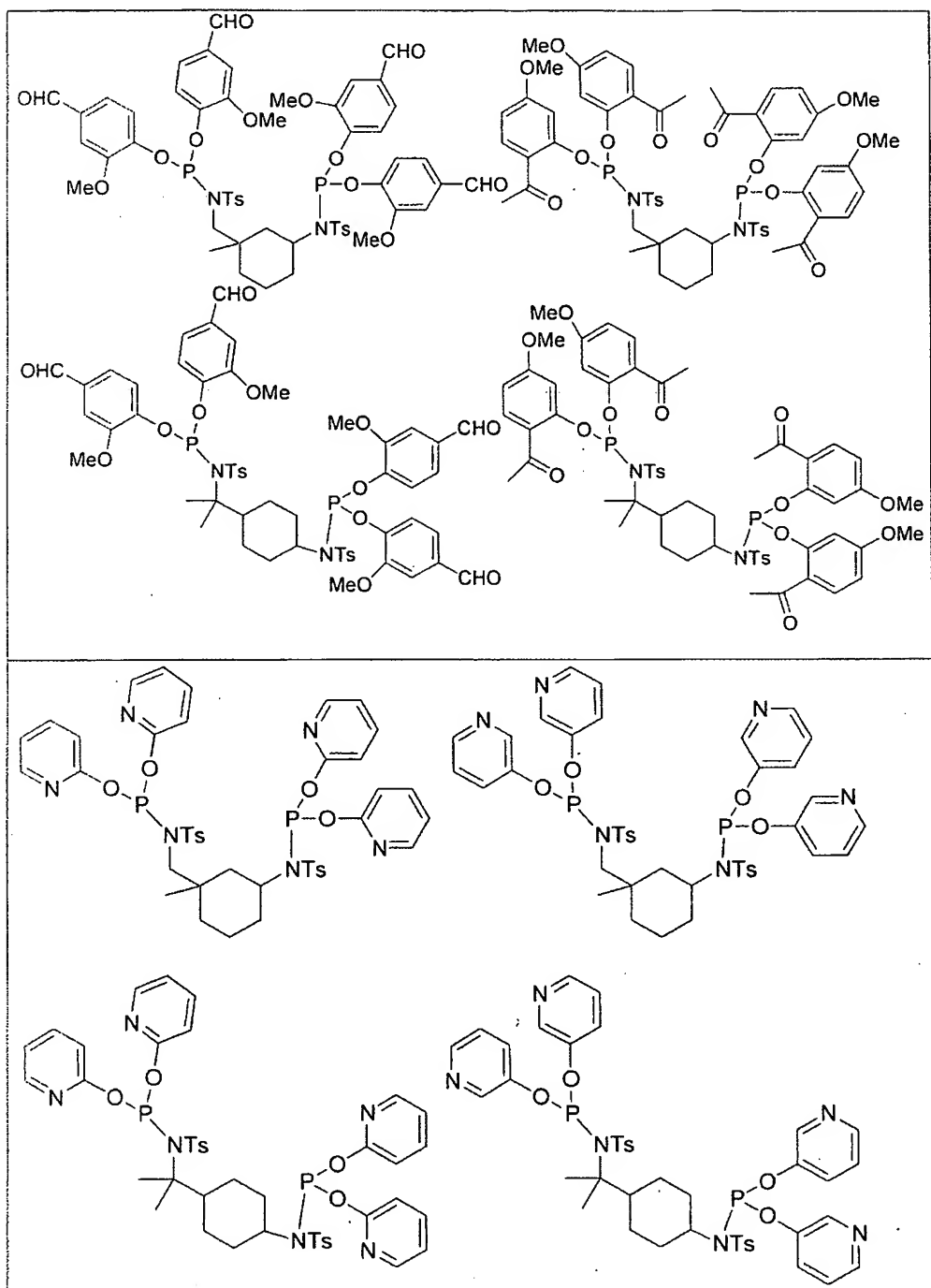


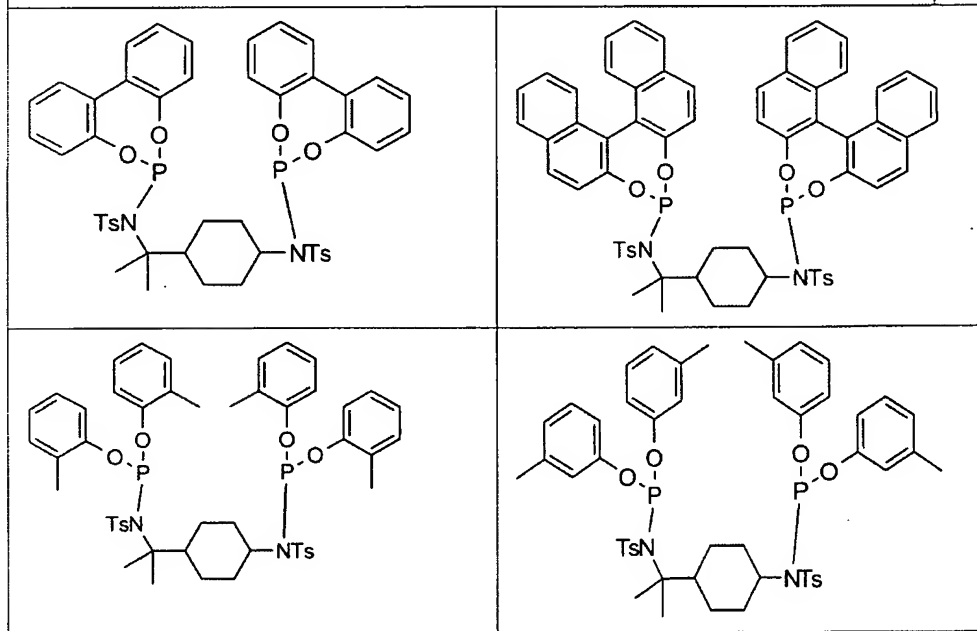
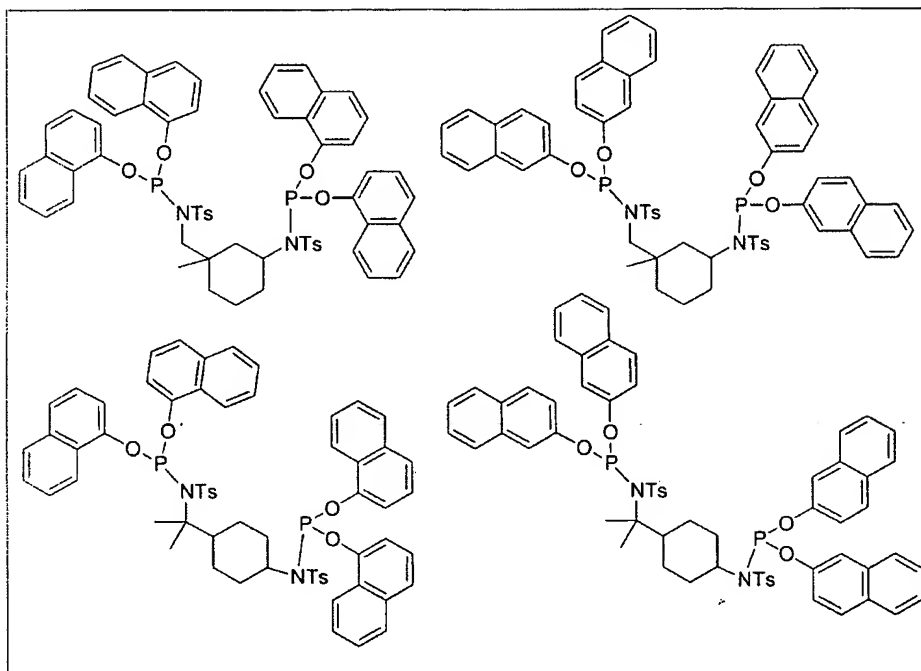


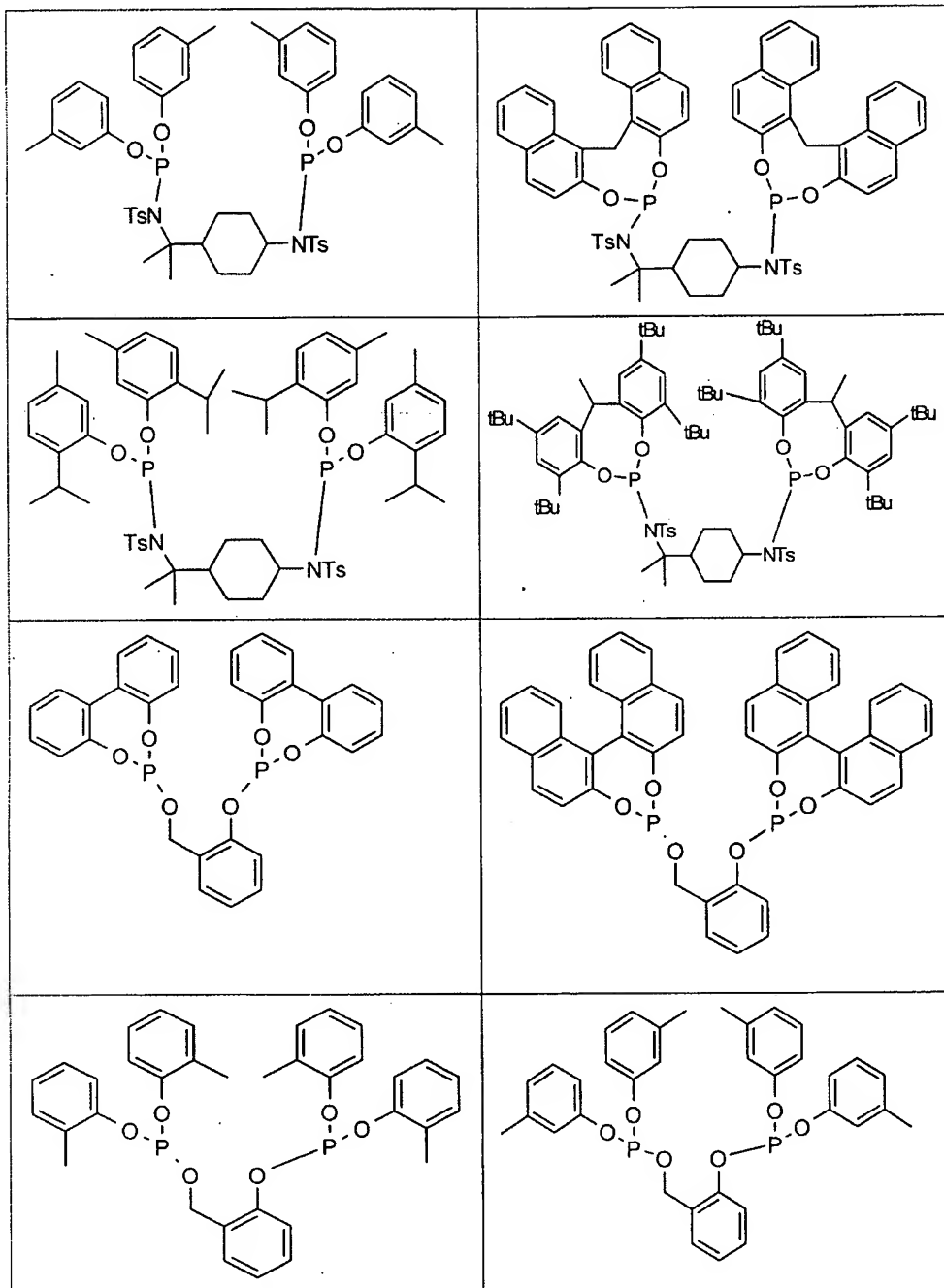
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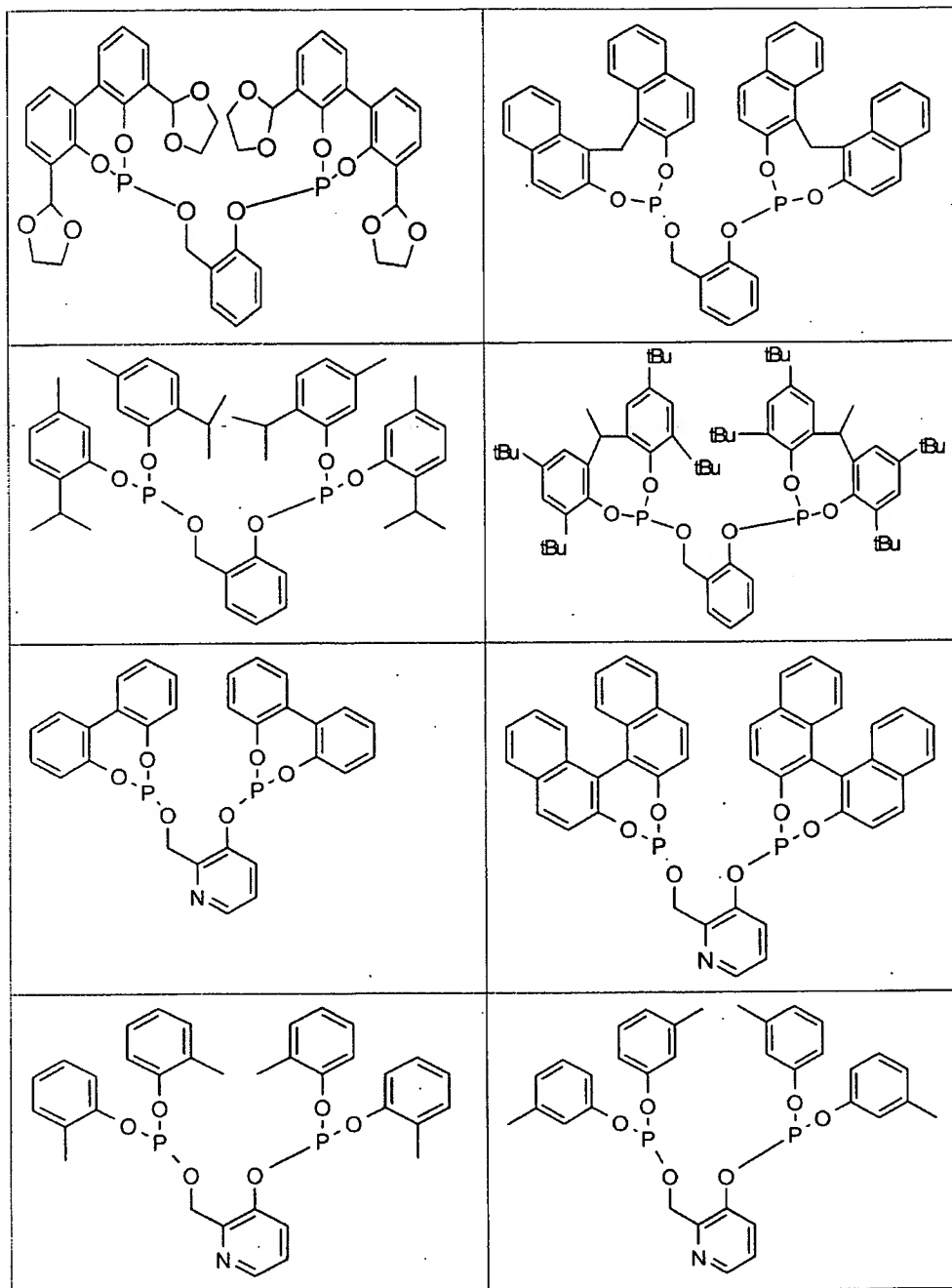
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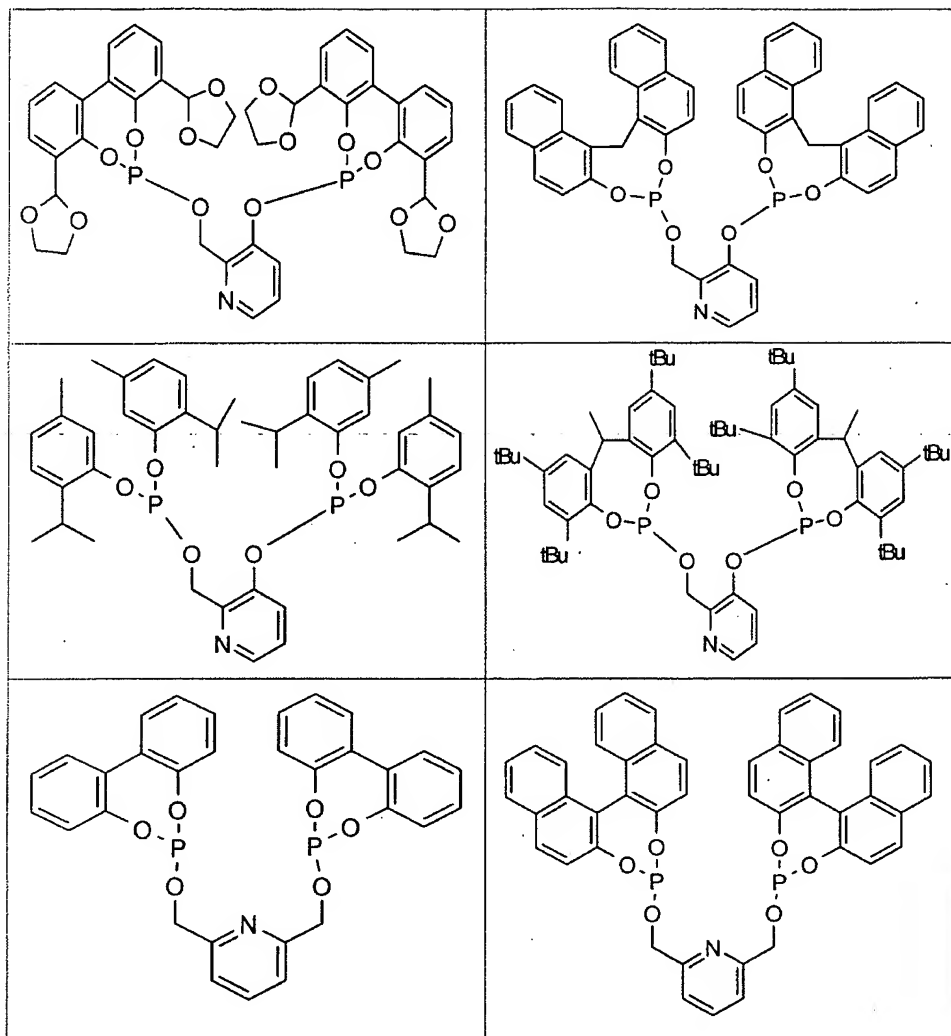




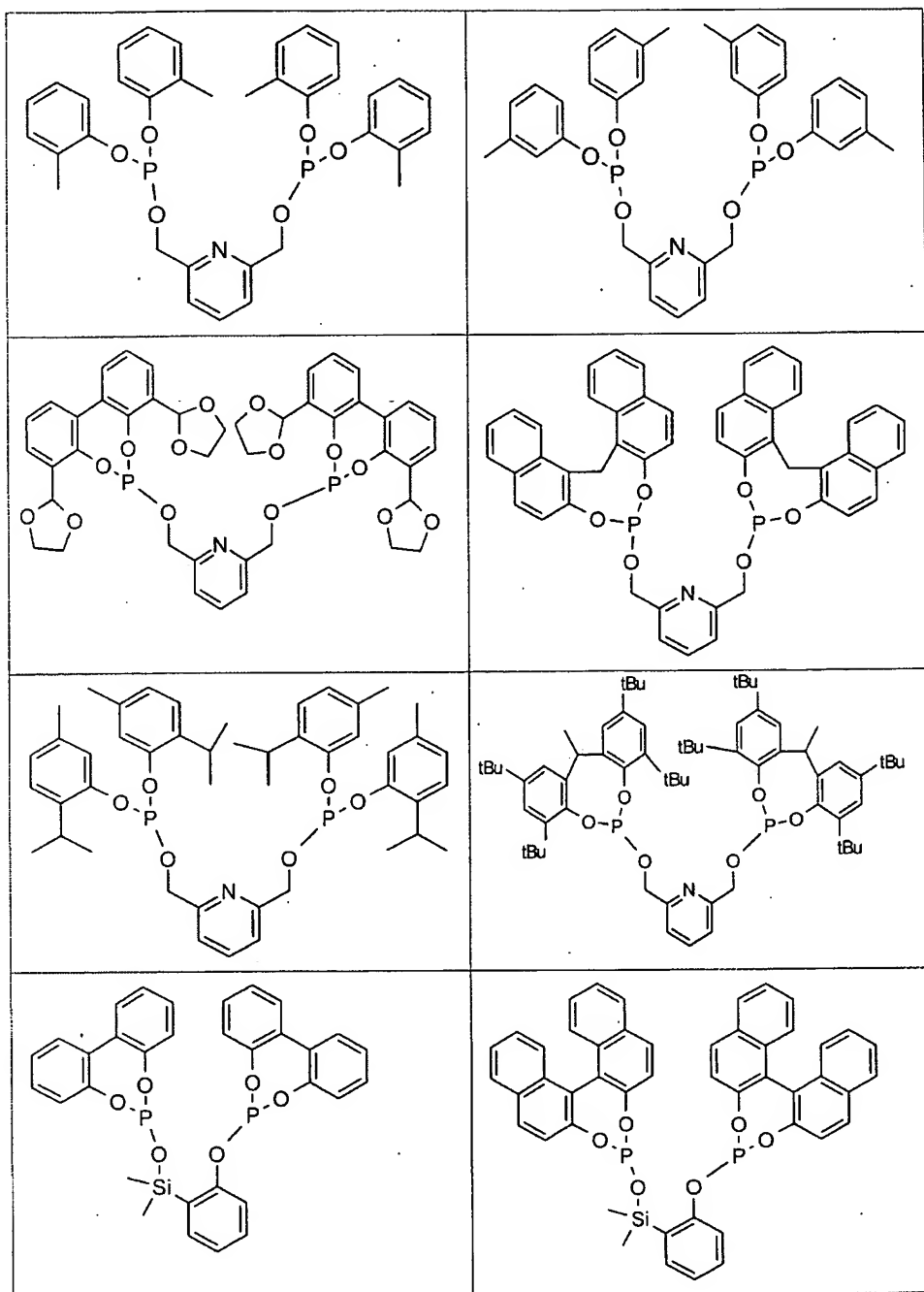
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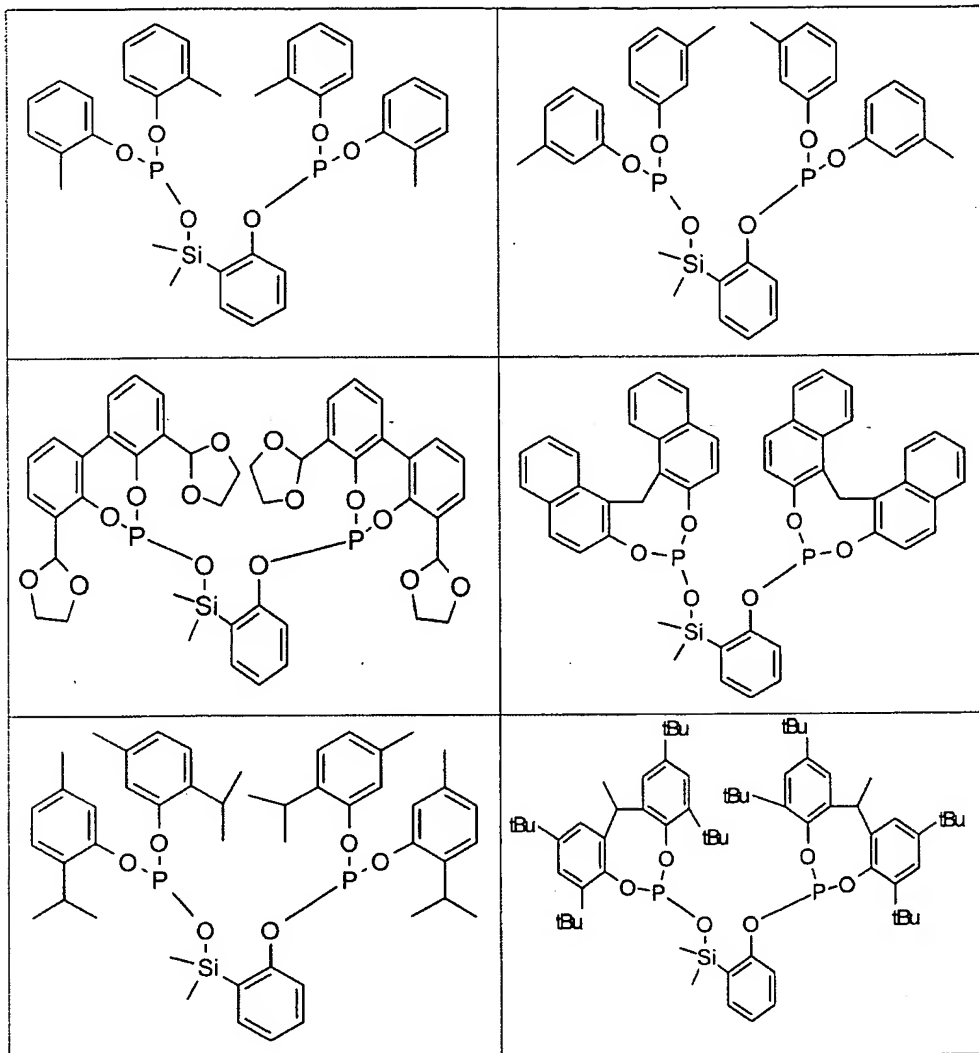
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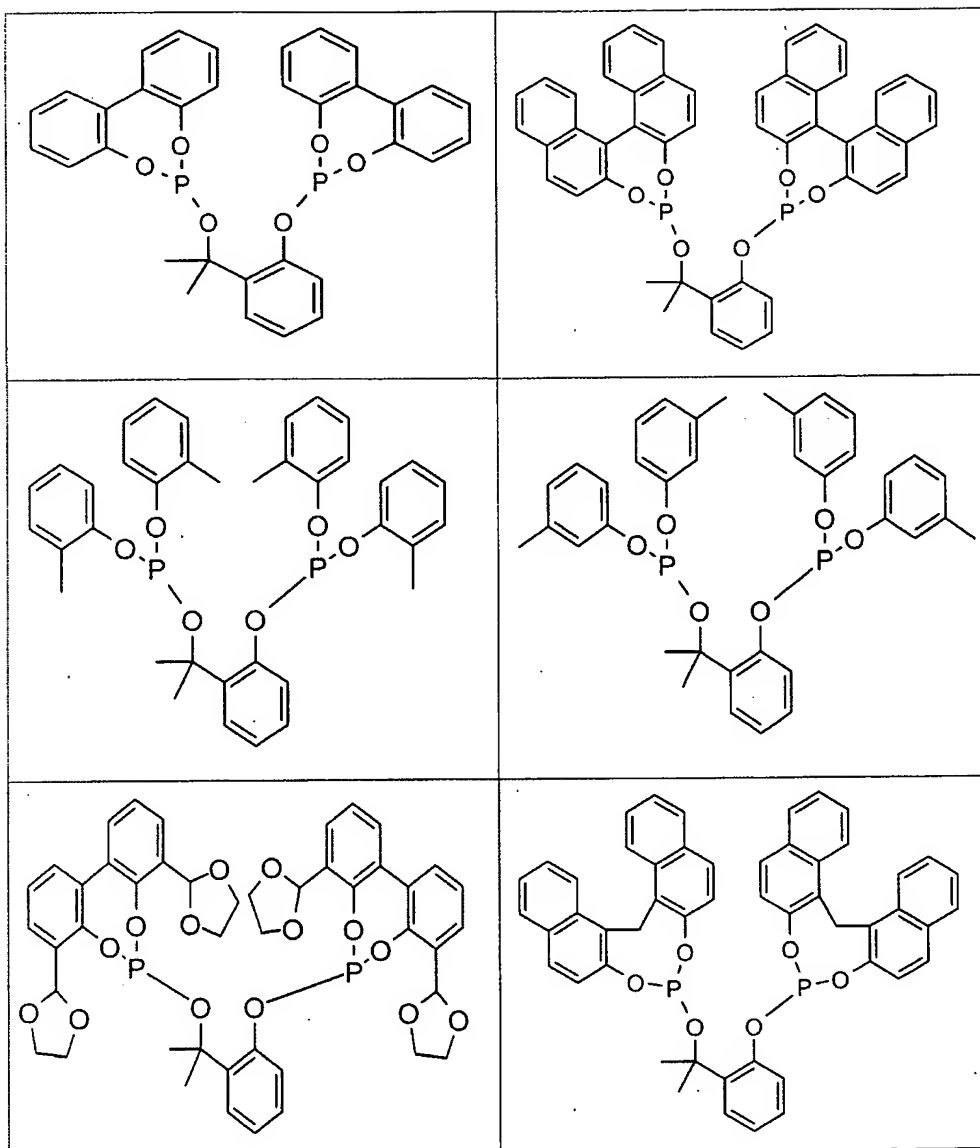


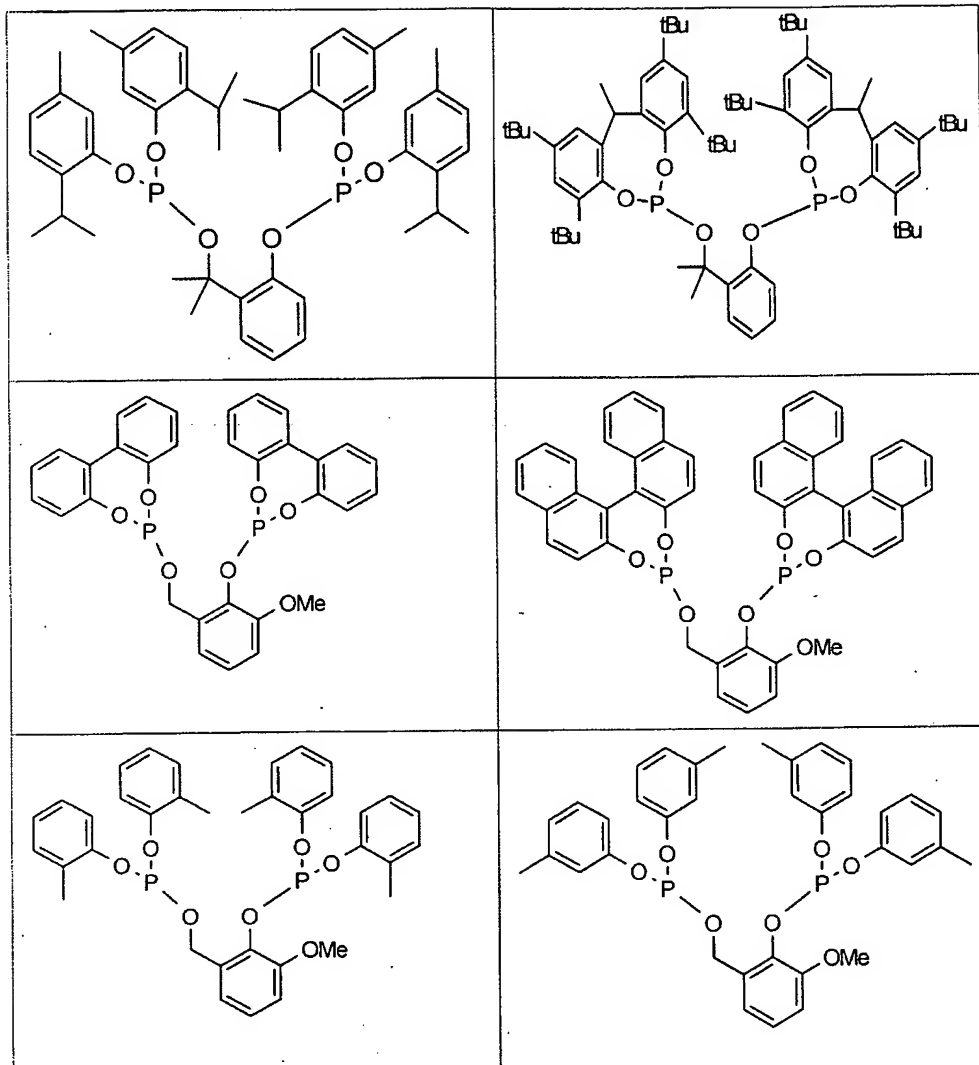
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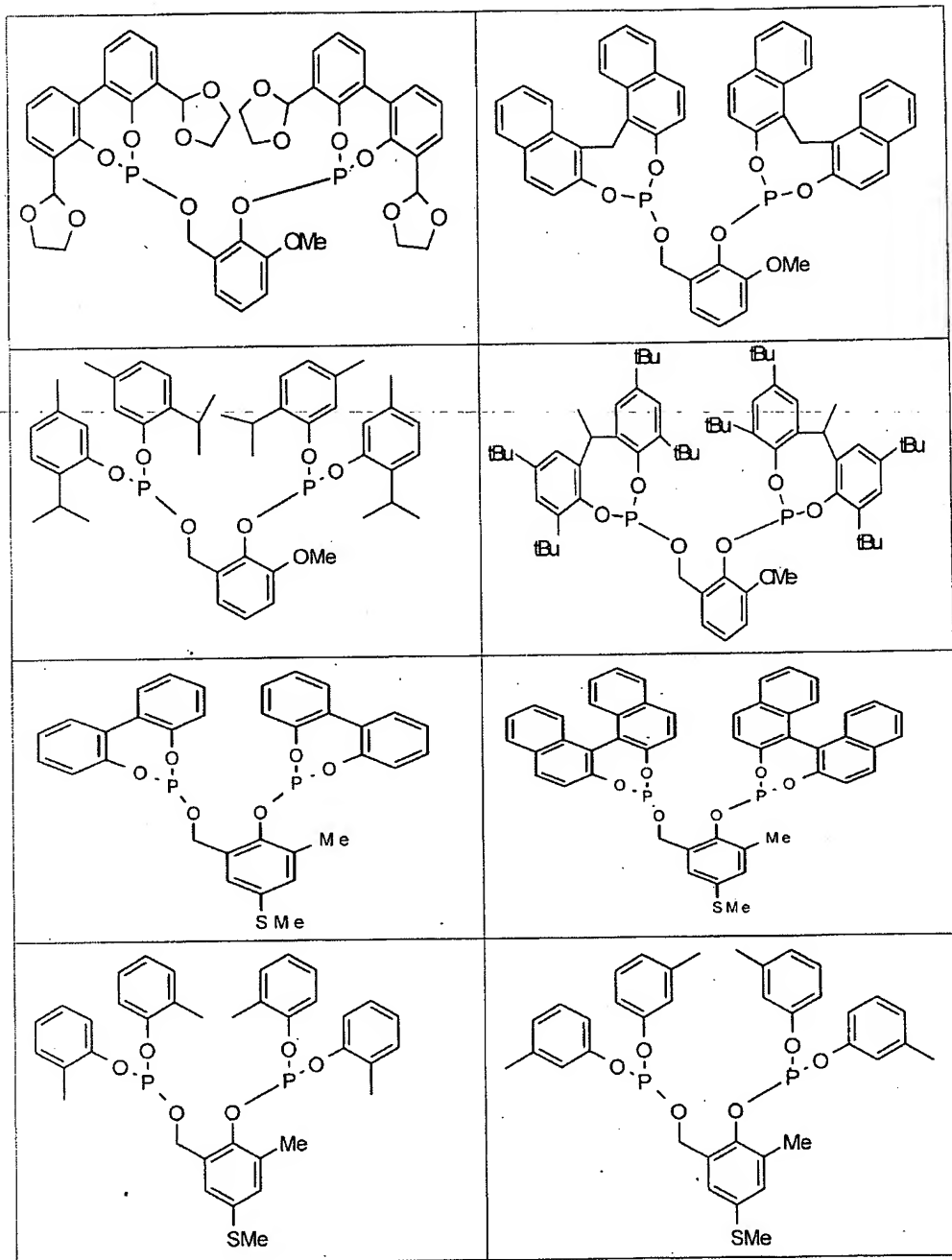


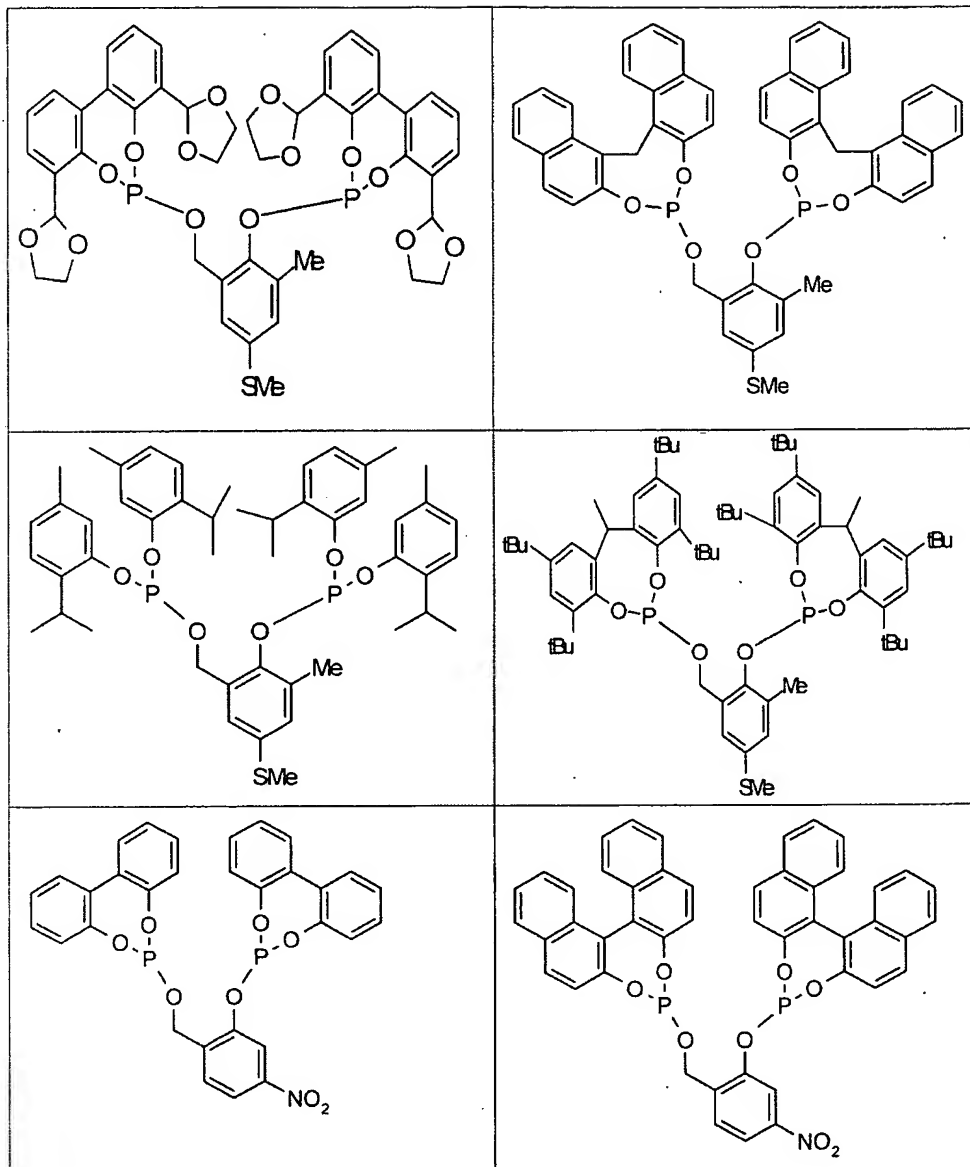


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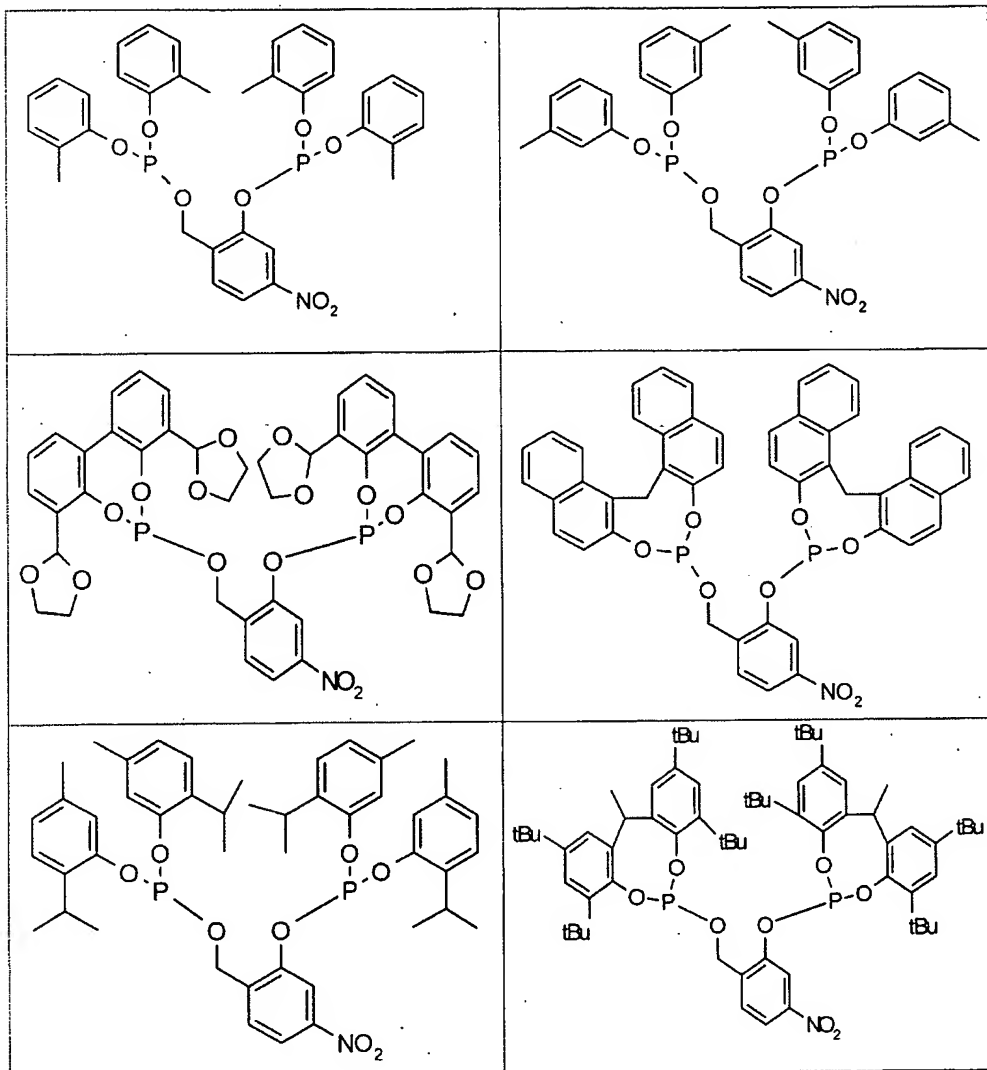


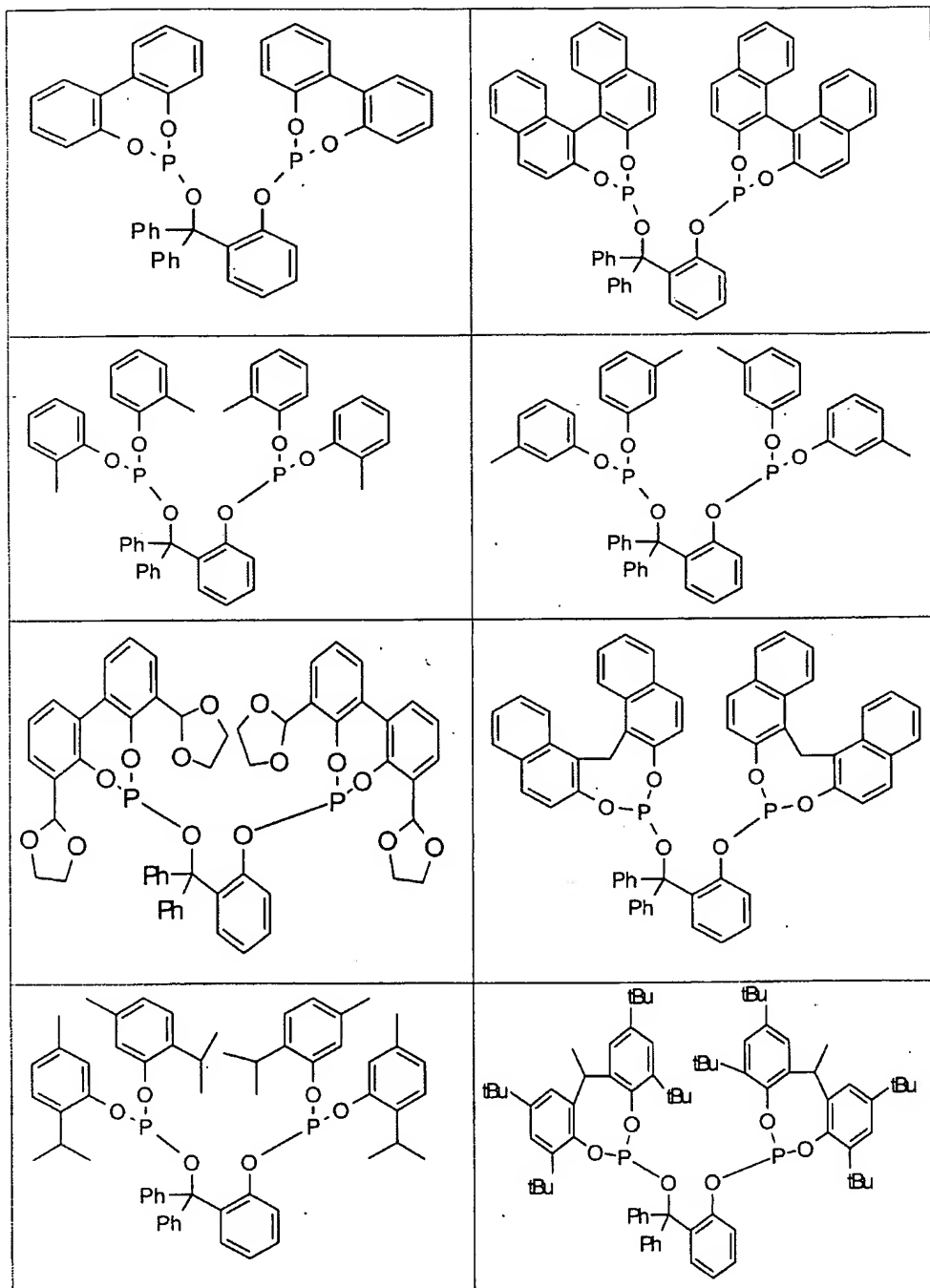


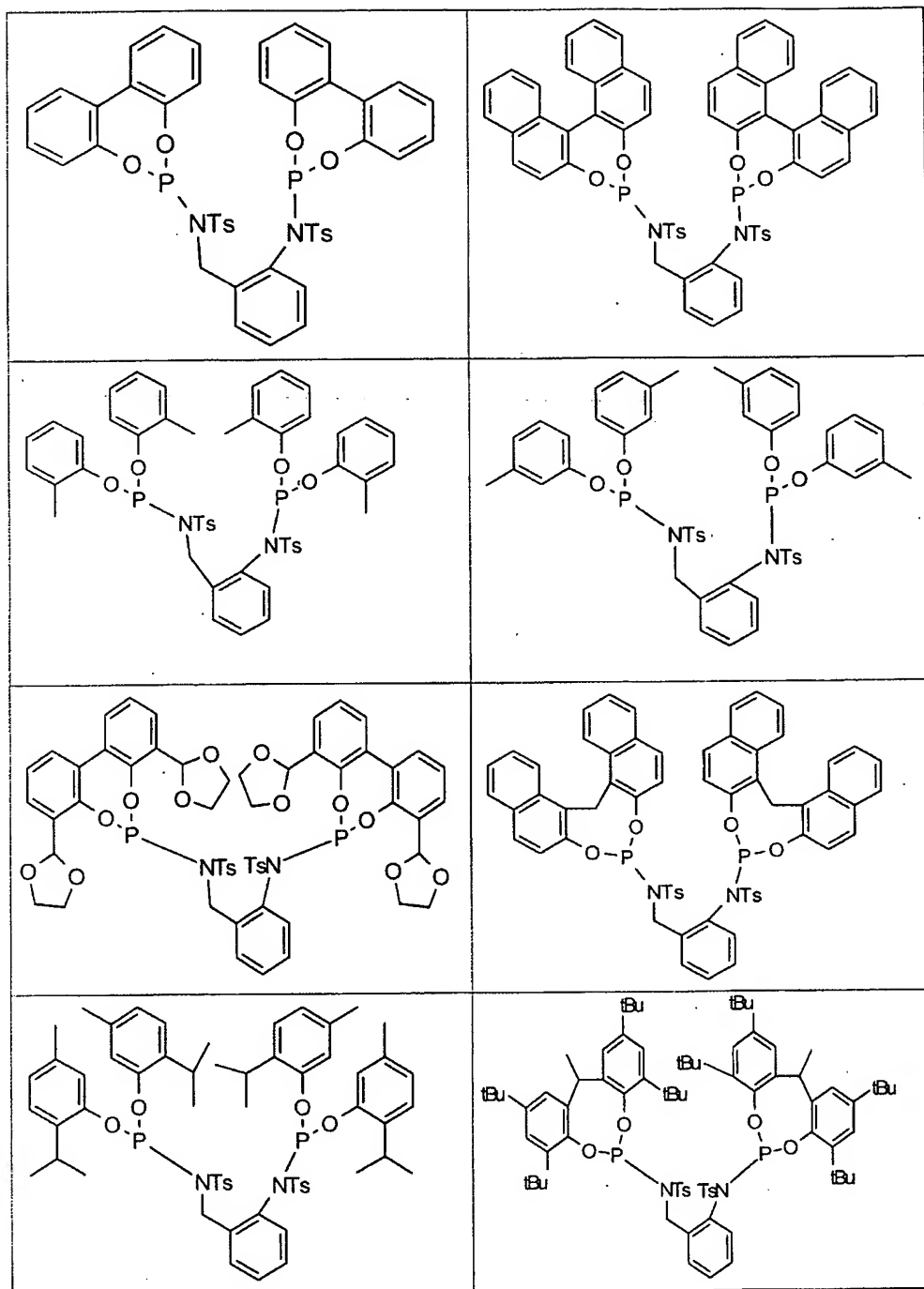




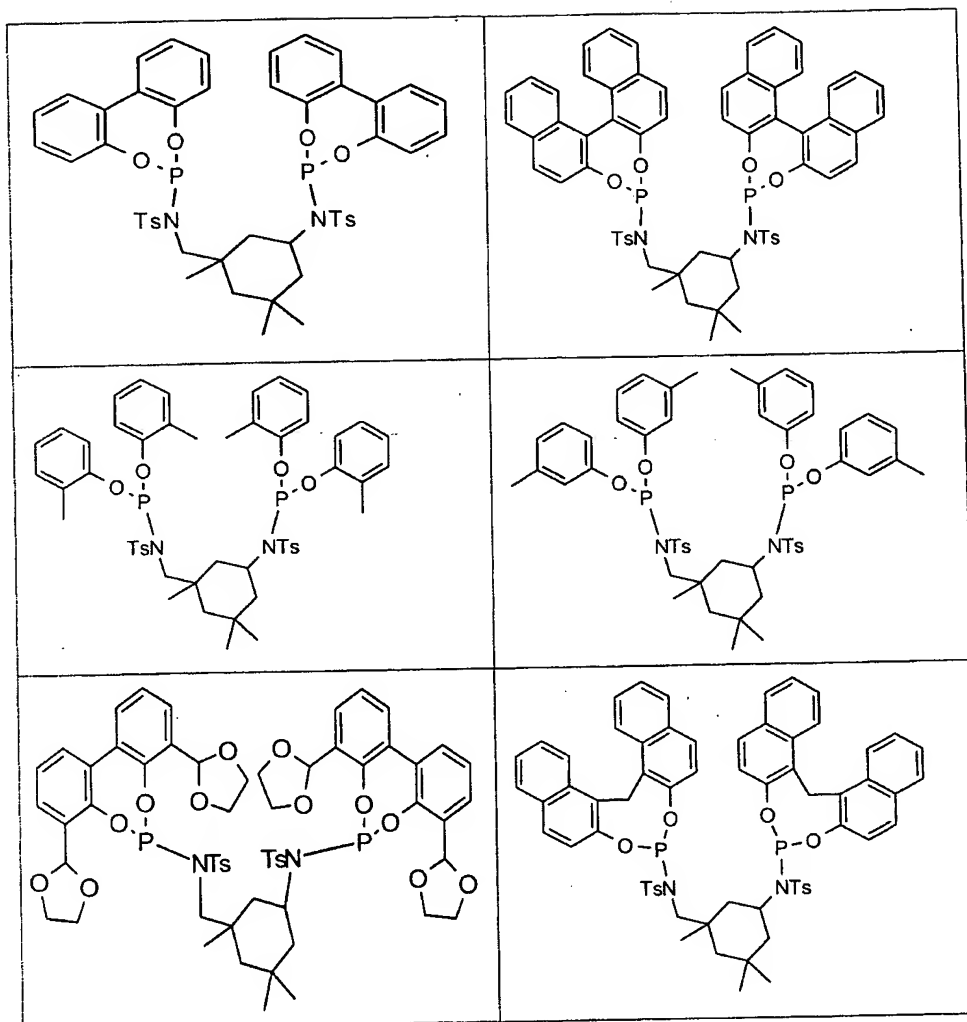
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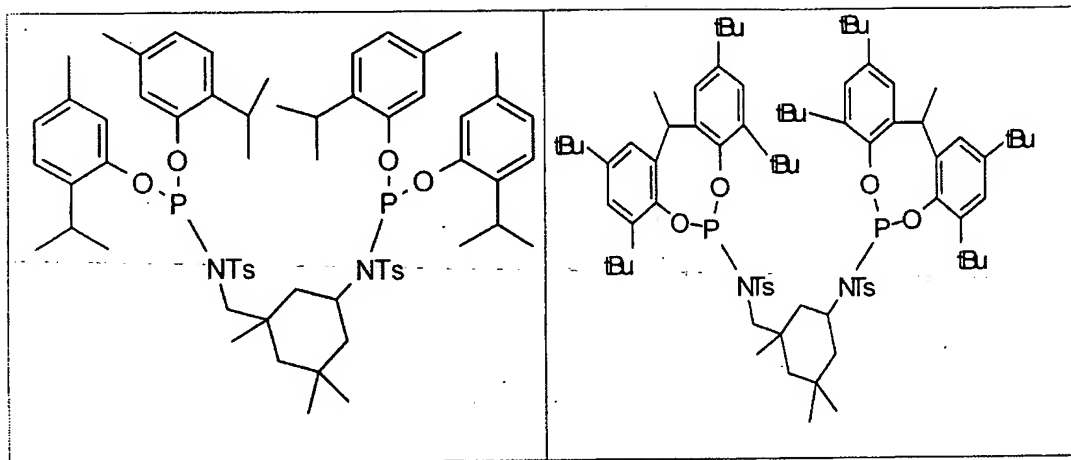
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Jean-Louis SEUGNET

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28. (Previously presented) The process according to Claim 25, wherein the metallic element is selected from the group consisting of nickel, cobalt, iron, ruthenium, rhodium, palladium, osmium, iridium, platinum, copper, silver, gold, zinc, cadmium and mercury.

29. (Previously presented) The process according to Claim 25, wherein the reaction is carried out in a single-phase medium.

30. (Previously presented) The process according to Claim 25, wherein the catalyst corresponds to the general formula (V):



in which

M is a transition metal,

L_f represents the organic ligand of formula (I) and

v represents a number between 1 and 4 (inclusive).

31. (Previously presented) The process according to Claim 25, wherein the liquid medium further comprises a solvent for the catalyst which is miscible with a phase comprising the compound to be hydrocyanated at the hydrocyanation temperature.
32. (Previously presented) The process according to Claim 25, wherein the transition metal compounds are nickel compounds in which nickel is in oxidation state zero, derivatives of nickel zero containing ligands, nickel carboxylates, carbonate, bicarbonate, borate, bromide, chloride, citrate, thiocyanate, cyanide, formate, hydroxide, hydrophosphite, phosphite, phosphate, iodide, nitrate, sulphate, sulphite, arylsulphonates or alkylsulphonates.
33. (Previously presented) The process according to Claim 25, wherein the hydrocarbon compound containing at least one ethylenic unsaturation is a diolefin, ethylenically unsaturated aliphatic nitrile, linear pentenenitrile, or monoolefin.
34. (Previously presented) The process according to Claim 25, wherein the transition metal is used in a amount of between 10^{-4} and 1 mol of transition metal per mole of hydrocarbon compound and wherein the organic ligand of formula (I) is used in a number of moles of from 0.5 to 50 relative to 1 mol of transition metal.
35. (Previously presented) The process according to Claim 25, wherein the hydrocyanation reaction is carried out at a temperature from 10°C to 200°C.
36. (Previously presented) The process according to claim 25 for hydrocyanating ethylenically unsaturated nitrile compounds to dinitriles, being operated in the presence of a catalyst system comprising at least one transition metal compound, at least one organic compound of formula (I) and a cocatalyst composed of at least one Lewis acid.

37. (Previously presented) The process according to Claim 36, wherein the ethylenically unsaturated nitrile compounds are pent-3-enenitrile, pent-4-enenitrile or mixtures thereof.
38. (Previously presented) The process according to Claim 37, wherein the linear pentenenitriles contain amounts of other compounds selected from the group consisting of 2-methylbut-3-enenitrile, 2-methylbut-2-enenitrile, pent-2-enenitrile, valeronitrile, adiponitrile, 2-methylglutaronitrile, 2-ethylsuccinonitrile and butadiene.
39. (Previously presented) The process according to Claim 36, wherein the Lewis acid is selected from compounds of the elements of groups Ib, IIb, IIIa, IIIb, IVa, IVb, Va, Vb, VIb, VIIb and VIII of the Periodic Table of the Elements.
40. (Previously presented) The process according to Claim 36, wherein the Lewis acid is selected from salts selected from the group of halides, sulphates, sulphonates, haloalkylsulphonates, perhaloalkylsulphonates, haloalkylacetates, perhaloalkylacetates, carboxylates and phosphates.
41. (Previously presented) The process according to Claim 36, wherein the Lewis acid is zinc chloride, zinc bromide, zinc iodide, manganese chloride, manganese bromide, cadmium chloride, cadmium bromide, stannous chloride, stannous bromide, stannous sulphate, stannous tartrate, indium trifluoromethylsulphonate, indium trifluoroacetate, zinc trifluoroacetate, lanthanum chloride, cerium chloride, praseodymium chloride, neodymium chloride, samarium chloride, europium chloride, gadolinium chloride, terbium chloride, dysprosium chloride, hafnium chloride, erbium chloride, thallium chloride, ytterbium chloride, lutetium chloride, lanthanum bromide, cerium bromide, praseodymium bromide, neodymium bromide, samarium bromide,

europium bromide, gadolinium bromide, terbium bromide, dysprosium bromide, hafnium bromide, erbium bromide, thallium bromide, ytterbium bromide, lutetium bromide, cobalt chloride, ferrous chloride, or yttrium chloride.

42. (Previously presented) The process according to Claim 36, wherein the Lewis acid employed represents from 0.01 to 50 mol per mole of transition metal compound.

43. (Previously presented) The process according to Claim 25, wherein 2-methylbut-3-enenitrile, present in the reaction mixture originating from butadiene hydrocyanation, is isomerized to pentenenitriles in the absence of hydrogen cyanide, in the presence of a catalyst comprising at least one organic ligand of general formula (I) or (V) and at least one transition metal compound.

44. (Previously presented) The process according to Claim 43, wherein the 2-methylbut-3-enenitrile subjected to isomerization is employed alone or in a mixture with 2-methylbut-2-enenitrile, pent-4-enenitrile, pent-3-enenitrile, pent-2-enenitrile, butadiene, adiponitrile, 2-methylglutaronitrile, 2-ethylsuccinonitrile or valeronitrile.

45. (Previously presented) The process according to Claim 44, wherein the isomerization reaction is carried out at a temperature from 10°C to 200°C.

46. (Previously presented) The process according to Claim 43, wherein the isomerization of 2-methylbut-3-enenitrile to pentenenitriles is carried out in the presence of at least one transition metal compound, at least one organic phosphorous ligand of the formula (I) and a cocatalyst composed of at least one Lewis acid.

47-48. (Cancelled)